

Technical Assessment: Application of ADF&G Fish Consumption Rates in Alaska's Human Health Criteria Revision Process

Deliberative Document



NOTE: *The purpose of this document is to complement the ADF&G Preliminary Analysis of Fish Consumption Rate Estimates for Rural Alaska Populations (February 2017) with specific technical or policy information associated with selecting a fish consumption rate. The majority of this information has been previously discussed during technical workgroup deliberations.*

1. **Background:** In support of the Department of Environmental Conservation's (DEC) efforts to revise human health criteria (HHC) in state water quality standards, DEC solicited a literature review of fish consumption rate (FCR) data exclusive to Alaska. DEC and the HHC Technical Workgroup had determined that the bulk of fish consumption surveys were not of sufficient quality to derive fish consumption rates (FCRs) to set ambient water quality standards. The literature review identified the Alaska Department of Fish and Game (ADF&G) Division of Subsistence Community Subsistence Information System (CSIS) database as a source of statewide harvest data from which FCRs can be derived. Establishment of FCRs using CSIS data is supported by ADF&G methodology (ADF&G Paper 261). DEC-Water established a Reimbursable Service Agreement with ADF&G-Subsistence to provide statistical data based on the following:
 - Fish Consumption Rates by Consumer v. Consumer and Non-consumers;¹
 - Fish Consumption Rates according to species (i.e., freshwater fish, salmonids, marine invertebrates (e.g., chitons, octopus), and marine mammals consumed in Alaska; and
 - Fish Consumption Rates based on geography (rural, urban, region).

The ADF&G FCR includes consumption of salmon, freshwater, and marine invertebrate species. Wet weight values are reported with no adjustment for percentage of time spent in marine waters or preparation technique. The ADF&G data set does not include the consumption of marine species (e.g., rockfish, cod, halibut).² Additional analysis of the ADF&G data set would require further analysis if all marine fish species are to be included when determining a FCR. Marine mammal consumption data is also included in the ADF&G analysis but is not discussed in this document as the technical workgroup (TWG) has yet to determine how to treat marine mammal consumption in the HHC process.

2. **Methods:** The ADF&G analysis includes a summary of the methodology used to derive rural and regional FCRs in the introduction of the analysis. ADF&G selected data collected between 2008 and 2014 to demonstrate recent consumption behavior patterns. ADF&G included data from a total of 109 communities across all six regions of Alaska. The dataset includes harvest data pertaining to all freshwater species, anadromous species, and marine invertebrates. Data

¹ Non-consumers are those individuals within a certain population that do not consume fish. This information is relevant when reviewing dietary information for the purpose of deriving a fish consumption rate.

² There is potential that failure to include any marine fish may underestimate the FCR as certain species (e.g., halibut) were included when deriving national criteria. Alaska-specific information regarding habitat residence time may result in further analysis of the ADF&G dataset.

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demonstrating long-term consumption patterns was outside of the scope of this project but can be found in Fall 2016.³

The ADF&G analysis was conducted using previously published methodology (Wolfe and Utermohle, 2000). ADF&G provides summary information on the treatment of outliers and similar analytical issues in the document. This information is critical to addressing the representativeness of the data and analysis process. The analysis also considers harvest and use characteristics by species and region. This information is relevant for interpreting the range of species harvested and relevance to the communities within a particular region.

The analysis of Salmonids is included at the request of DEC based on science policy precedent set in other Pacific Northwest states.

3. **Results and Discussion:** The ADF&G analysis demonstrates the wide range of fish consumption rates that exist in Alaska. While this information is very important to the HHC process, DEC notes that several questions should be addressed by the TWG before any decisions are made. They include:
- How representative is the ADF&G data of Alaska's general and high consuming populations?
 - How do the population and consumption data for the ADF&G dataset differ from those collected in tribal-specific surveys (i.e., Seldovia or Sun'aq⁴)?
 - How do population demographics differ between the different ADF&G regional datasets (e.g. are Alaska Natives more or less represented in certain regions)?

DEC has been monitoring the actions the U.S. Environmental Protection Agency (EPA) taken in Idaho, Oregon, and Washington and various policy documents previously released and notes the following:

- EPA has expressed a preference for inclusion of salmonids⁵ and market fish data when determining fish consumption rates;
- EPA has expressed a preference for local/regional data over statewide (EPA 2000)
- EPA has expressed a preference for use of *consumer only* data⁶;
- EPA has expressed a preference for use of the 90th percentile of high consumer data to account for suppression⁷- an issue that has received more attention recently; and

³ Fall 2016.

⁴ FCR data collected by the Village Tribe of Seldovia and the Sun'aq tribe is specific to Alaska Natives in those geographical regions. The FCR study is currently in publication but preliminary statistical values are noted in Table 1.

⁵ Preference was based on data indicating that salmonids were acquiring contaminants in state waters.

⁶ See USEPA 2016

⁷ Suppression is a term used to define situations where reduction in a population's historic high fish consumption due to a variety of factors: Decreased fish abundance, fears of chemical contamination, changes in social structure, loss of access to fisheries resources, decreased fishing due to laws or regulations, lack of access to equipment, etc. Additional information is available in EPA 2016.

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- EPA promotes use of implementation tools, such as variances and compliance schedules, in situations where background concentrations due to natural conditions may be equal or exceed a human health criterion.

EPA 'preferences' are based on language in documents pertaining to the EPA 2000 Methodology, 2013 Frequently Asked Questions, 2015 Update, and 2016 Promulgation of Human Health Criteria for the State of Washington. DEC staff have provided the following questions as a means of framing potential approaches for the Workgroup as it considers the ADF&G data and potential FCR for Alaska.

3.1. Question: Should Alaska apply Consumers only or Consumers & Non-consumers data for the proposed target population?

DEC staff reviewed the U.S. Environmental Protection Agency Partial Approval/Partial Disapproval of Washington's Human Health Water Quality Criteria and Implementation Tools (EPA 2016) as a means of providing insight into EPA's most recent decisions on this issue. A key term of concern in the Washington decision is EPA's frequent use of the term *consumers*. The Fact Sheet repeatedly says the criteria are designed to protect fish consumers.

Example: EPA considers the FCR of 175 grams per day to protect fish consumers in WA including tribes with treaty protected rights-and fish consumers downstream in Oregon.

EPA reiterates their support of use of consumer-only data on pg. 15 of the EPA Technical Support Document;

“EPA is also supportive of Ecology's decision to select a FCR that represents *the upper percentile consumption rates from local and/or regional consumer-only fish consumption data* (Emphasis added).”

DEC interprets this to mean that EPA explicitly targets *consumers* of aquatic life as the target population. Application of consumer-only data results in higher FCRs for all percentiles.

EPA also clarified in the Washington promulgation that the final rule establishes that the portion of the tribal population exercising reserved fishing rights is the target population for the purposes of deriving protective criteria. The issue of tribal fishing rights and how that would be interpreted in Alaska has yet to be fully vetted by DEC and Department of Law and is not discussed in this document.

The ADF&G data is formatted to reflect both consumers and non-consumer and consumer only data. The Workgroup has previously discussed this issue and there was consensus that DEC should be targeting consumers when establishing a target population.

3.2. Question: What factors should Alaska consider when choosing target population percentiles?

EPA 2000 methodology establishes a hierarchy in which local relevant data is considered to be preferred over that of regional or national data. EPA has not expressed an explicit preference

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regarding Alaska's target population. Policy statements in various documents appear to provide states with a certain degree of autonomy when making specific choices pertaining to FCRs.

- EPA 2000 Methodology: States and authorized Tribes may use either high-end values such as the 90th or 95th percentile values or average values for an identified population that they plan to protect (e.g., subsistence fishers, sport fishers, or the general population).
- EPA 2013 (FAQ)⁸: In general, EPA considers protection of the general population to be represented by the 90th percentile of a total exposure distribution utilizing a "per capita" fish consumption distribution. If present in the state, subsistence fishers should be considered on a site specific basis.
- EPA also recognized that some States may need to consider highly exposed populations, and provided default values for sport fishers and subsistence fishers which represent the average or median percentile consumption values for these groups⁹. EPA used this same approach with respect to the 2015 national recommended criteria.¹⁰ In sum, EPA in its national recommended criteria uses the 90th percentile of the general population FCR, and the 50th percentile or average for high-consuming groups such as sport and subsistence fishers.

To date the TWG has discussed the pros and cons of deriving FCRs based on statewide as well as local FCR data. Much of this discussion has been focused around the fact that harvest of resources and their consumption may not occur in the same region, the implementation of the criteria in water pollution control programs, and the protection of downstream waters. The TWG also discussed whether the FCR should represent Alaska's general population or target Alaska's rural population who are considered to be the primary practitioners of subsistence.

EPA has expressed a preference for use of upper percentile FCRs of local contemporary fish consumption surveys in the absence of data that clearly demonstrates what the current unsuppressed FCR is for a relevant population.¹¹ While it is likely that unsuppressed FCRs will be readily available, they may be bounded on the low end by upper percentiles of current FCRs and on the high end by estimates of historic consumption. Analysis of historic ADF&G data by Fall (2016) determined that rural harvest has declined 26% below an estimate established in 1986 but that value is not consistent on a regional basis and influenced by such factors such as cost of living, population shifts, and cultural change. In short, determining the presence or absence of suppression in Alaska is complicated.

3.3. QUESTION: Which ADF&G FCRs are representative of high consumers and applicable as the target population?

⁸ <https://www.epa.gov/sites/production/files/2015-12/documents/hh-fish-consumption-faqs.pdf>

⁹ EPA 2000 Methodology p. 1-12, 1-13; 4-27

¹⁰ 2015 EPA Response to Scientific Views from the Public p. 16

¹¹ The Technical Support Document for the Washington rulemaking demonstrates the current policy preferences in Region 10 including accounting for suppression.

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The EPA language allows states to make certain policy decisions regarding how they choose a target population. As discussed previously, there is a preference for use of high consumer data. Consumers are those people within a population who consume aquatic life and a high consumer can be statistically characterized the 90th-95th percentile of all consumers.

During previous deliberations of the TWG it was proposed that Alaska’s rural population be treated as the target population and that this population is likely to be characterized as high consuming.

“If a State or Tribe chooses values (whether the central tendency or high-end values) from studies that particularly target high-end consumers, these values should be compared to high-end fish intake rates for the general population to make sure that the high-end consumers within the general population would be protected by the chosen intake rates.”¹²

To help put this preference into context, DEC developed the following table that ranks the different FCR values from least to most conservative.

Table 1. ADF&G 2017 Summary Values.

Potential Target Populations	Fish consumption rate or range (grams per day)
1. Consumer only/Local FCR study ¹³ /mean	117.4 / 232.8
2. Consumer and Non-consumer/Rural/Mean	134.3
3. Consumer only/Rural/Mean	150.7
4. Consumer and Non-consumer/ADF&G/Region/mean (highest recorded value)	180.5
5. Consumer only/ADF&G Region/mean (highest recorded value)	188.4
6. Consumer and Non-consumer/Rural/90 th	299.2
7. Consumer only/Local FCR study/90 th percentile	293.5 / 528.3
8. Consumer only/Rural/90 th	318.2
9. Consumer only/ ADF&G regional value/90 th percentile (highest recorded value)	374.8

NOTE: These values are based on the sum total of salmon, non-salmon, and marine invertebrates. Marine mammals are **not included** due to ongoing discussion regarding their treatment in the HHC process. Marine species are not included per Species-specific data is noted at Appendix D of the ADF&G analysis.

3.4. QUESTION: How ‘representative’ is the ADF&G data of Alaska Natives?

¹² EPA 2000 Methodology p. 4-26; see also 2013 FAQ: “An analysis of protectiveness of the criteria for the general population, recreational fishers and subsistence fishers should be included in the criteria documentation.”.

¹³ For **Local FCR Study** DEC applied the Cook Inlet Tribes FCR established for Adult Consumption of Fish During High Fish Consumption Months/Weighted/Consumers only/All respondents. *Assessment of Cook Inlet Tribes Subsistence Consumption*. 2013. Appendix C. and Sun’aq Seafood Assessment (2017) (in publication)

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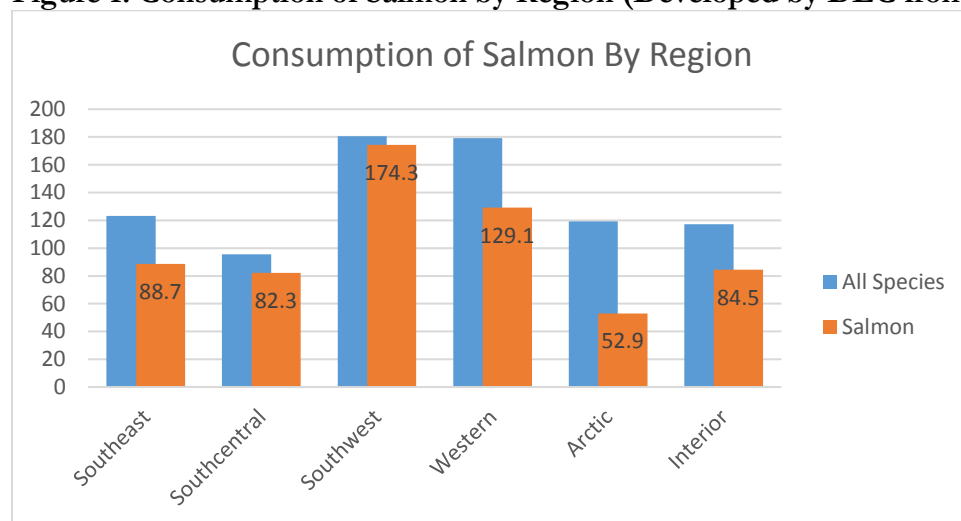
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State FCRs are generally not established based on ethnicity but rather on consumer behavior and respective percentiles of the population of concern. However, ethnicity data may be appropriate when estimating which datasets are comprised of a population more or less similar to the Seldovia or Sun'aq surveys. This information is available in Appendix B of the ADF&G Summary. Further analysis of the ADF&G data, including weighting based on ethnicity, may be appropriate before drawing any conclusions when comparing per capita consumption of the general population against tribal-specific data. This is a question that the workgroup may wish to discuss in further detail.

3.5. QUESTION: How much of the FCR can be attributed to salmon?

DEC reviewed the sum of total salmon, non-salmon fish, and marine invertebrate per capita consumer consumption data (Table 1) against salmon consumption by region (Appendix D). DEC then calculated the approximate percentage of total consumption that can be attributed to salmon.

Figure 1. Consumption of Salmon by Region (Developed by DEC from ADF&G Summary)



DEC determined that salmon represent approximately 74% of consumer and non-consumer fish consumption of aquatic species (not inc. marine mammals) reviewed by ADF&G. Both consumer and non-consumer (all user groups) values are applied as the species consumption values were calculated using all user group data.

Table 2. Consumption of Salmon by Region

Region	Fish Consumption Rates per Capita Consumers and Non-consumer (Table 1)	Mean Salmon g/day Consumers and Non-consumers (Appx D)	Percentage of Total
Southeast	123.3	88.7	0.719
Southcentral	95.6	82.3	0.860
Southwest	180.5	174.3	0.966
Western	179.3	129.1	0.720

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Arctic	119.3	52.9	0.443
Interior	117.3	84.5	0.720
		Average	0.738

3.6. QUESTION: How does the ADF&G data compare to that of the Cook Inlet Tribal (Seldovia) data?

DEC reviewed data provided in the Seldovia (2013) report against ADF&G regional (Southcentral) data to determine how comparable they are. It appears that the recorded values are very similar to one another when considering all user groups as well as consumer only data from a regional perspective.

Table 3. Adult consumption of all fish (All user groups)

All User Groups	Mean	Median	95th
Cook Inlet Tribes*	106.8 ± 23.9	55.3	267.1
ADF&G Southcentral**	95.6	74.4	264.8

* Appendix B. Total Seafood. Weighted value. Consumers and non-consumers

** ADF&G Table 1 Freshwater, salmon, marine invertebrate consumption. Consumer and non-consumer values

Consumers only	Mean	Median	95th
Cook Inlet Tribes*	107.7 ± 24.2	57.0	267.6
ADF&G Southcentral**	107.1	85.2	309.8

* Cook Inlet Tribal Survey. Appendix B. Total Seafood. Weighted value. Consumers and non-consumers

** ADF&G Table 1 Freshwater, salmon, marine invertebrate consumption. Consumer and non-consumer values

While not included in this document, ADF&G also conducted a community specific analysis and determined that Seldovia monthly estimates were more comparable to ADF&G estimates for both fish and shellfish. While some differences between the data do exist at the community level, this could be attributed to differences in the sample size for each community, range of species documented, conversion factors, and study year. Additional document is available upon request.

4. **Conclusion:** DEC staff have come to the following conclusions based on review of various background documents developed by EPA:

- DEC should anticipate that EPA will expect Alaska to apply *Consumer only* data as a primary consideration when establishing a target population.
- DEC does not know whether EPA will express a preference regarding the ADF&G data (represents statewide and regional values) or Tribe-specific data (more representative of “local” consumption) until further analysis of the similarities and differences between the surveys is discussed.
- DEC needs to determine whether to characterize Alaska’s rural population as the “general” population or a “high consuming” population:

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- DEC may also consider a particular ADF&G region as the target population. This approach is theoretically consistent with the EPA 2000 methodology if a region can be considered a high consuming sub-population.
- DEC may need to conduct further analysis of the ADF&G data to include marine species. While this approach is not specifically noted in the EPA 2000 methodology, anadromous fish were included in Washington's approach.
 - Leaving the RSC at 0.2 would account for the consumption of marine species.
- DEC application of the mean of the *rural consumer* population as the target population (150.7 g/day) is not likely to address EPA's concerns about suppression..
- DEC and ADF&G will need to compare the finalized Sun'aq data against that collected by ADF&G once it is published and available for review.
- DEC may need to further consider the relevance of contemporary tribal data (Seldovia/Sun'aq) for determining the target population following additional discussions with EPA.

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